



Modeling of asphalt by means of discrete element method – an initial study

Feng, Huan; Hededal, Ole; Stang, Henrik

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Feng, H., Hededal, O., & Stang, H. (2013). *Modeling of asphalt by means of discrete element method – an initial study*. Abstract from Strategisk forskning i transport og infrastruktur, Kongens Lyngby, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

COOEE

Modeling of asphalt by means of discrete element method – an initial study

Huan Feng, Ole Hededal, Henrik Stang
DTU Civil Engineering

Asphalt is a viscous material consisting of a matrix of stones, sand and filler glued together by a bituminous binder, which is used in many pavement constructions. Knowledge about asphalt is mainly based on the results of experimental and empirical investigation, which comes at the expense of conducting time-consuming and lab-costly procedures. The use of numerical models, capable of reducing greatly the testing cost, has shown great potential in characterizing asphalt-aggregate mixtures for both material evaluation and structural design purposes, [1],[2]. Discrete element method (DEM) is one type of numerical simulation method which allows the finite displacement and rotation of discrete particles, making it an excellent tool to simulate the complex micro interaction between aggregate particles within an asphalt mixture, [3],[4]. In this research, PFC3D – a commercial DEM program – will be applied. The work presented here will focus on the discrete element method as a tool for modelling composite materials, i.e. determination of a representative volume; boundary conditions; characterisation of the components mastic (binder + filler) and aggregates; and establishment of virtual test samples. Results from initial tests will be presented and the future development of the model towards characterising asphalt from its composition will be outlined.

[1] Jun, C., Tongyan P., Jingya C., Xiaoming H., Yang L. (2012). Predicting the Dynamic Behaviour of Asphalt Concrete Using Three-dimensional Discrete Element Method. J. Wuhan University of Technology-Mater. Sci. Ed. 27(2), 382–388.

[2] Adhikari, S. and You Z. (2010) 3D Discrete Element Models of the Hollow Cylindrical Asphalt Concrete Specimens Subject to the Internal Pressure. International Journal of Pavement Engineering, 11(5), 429–439.

[3] Liu, Y. and You, Z. (2011). Discrete-Element Modeling: Impacts of Aggregate Sphericity, Orientation, and Angularity on Creep Stiffness of Idealized Asphalt Mixtures. J. Eng. Mech., 137(4), 294–303.

[4] Liu, Y. and You, Z. (2011) Accelerated Discrete-Element Modeling of Asphalt-Based Material with Frequency-Temperature superposition principle. J. Eng. Mech., 137(5), 355–365.